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Alternative options for feeding cows during drought

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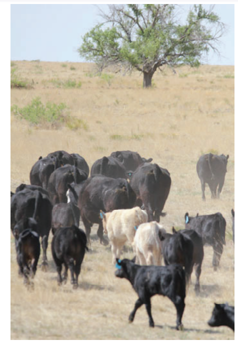
Outline

- Substitution
- Limit feeding cows
  - TMR
  - Hays
  - Annual forages
- Crop residue grazing
- Additives
- Others



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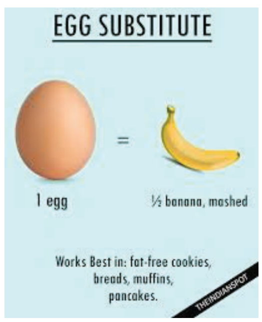
SUBSTITUTION

Replacing one type of feed with another



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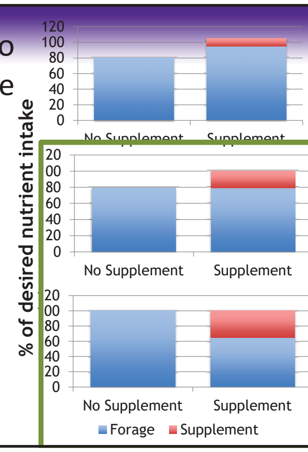
Why need to supplement cattle

- Increase forage intake
- Forage could be lacking in energy or protein
- Lack of adequate forage
- Requirements exceed that offered by forage base
- Inadequate ratio of protein to energy



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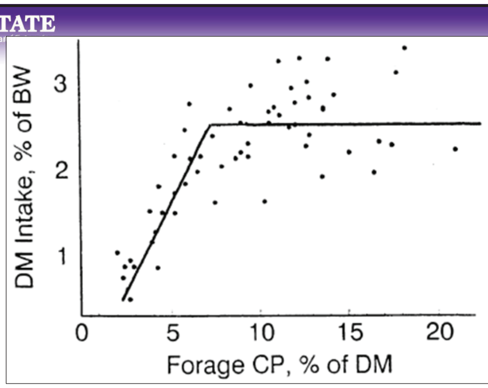

Moore and Kunkle, 1994

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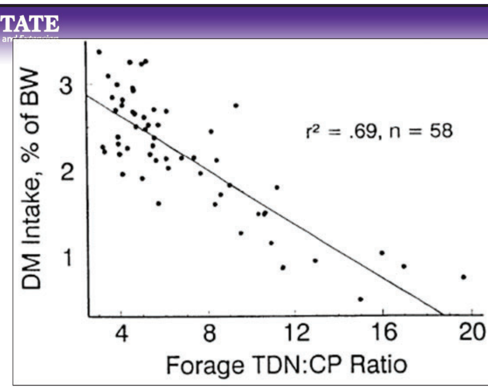

Moore and Kunkle, 1994

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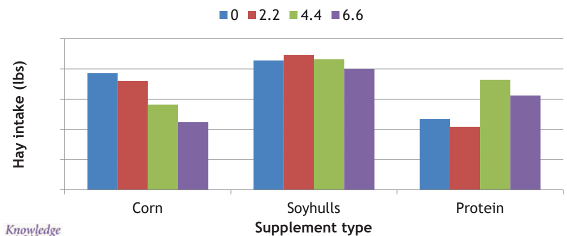
Substitution

- Traditionally grass and hay are cheap so we want to maximize intake
  - Dormant season – feed protein to increase intake
  - Corn is the devil because it reduces forage intake



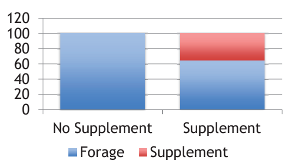
Adapted from Chase and Hibberd (1987); Martin and Hibberd (1990); DelCurto et al. (1990)

Double-edged sword - Energy

- Grazing forage:
  - Low-protein, energy dense supplement fed <0.3% of BW/d = minimal impact on forage intake or slight increase forage intake
- High amounts of high energy feeds:
  - Substitution effect so use less forage
- If wanting to increase stocking rate or have limited forage than substitution will be great

Energy supplementation

- Starchy feeds will cause substitution
  - Corn, milo, wheat
- Alternative digestible fiber energy sources good energy source that might eliminate substitution effects
  - Soybean hulls, wheat midds, corn gluten feed
- Oklahoma research (Cravey et al., 1994)
  - Corn-based supplement fed at 0.7-1% of BW resulted in a 1:1 substitution rate
  - Led to 33% increase in stocking rate

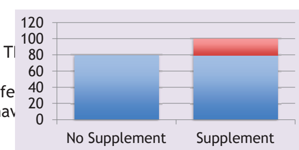


Substituting one for another

Feed	TDN %	CP %
Corn	88	9.8
Oats	73	13.6
Milo	85	11.3
Wheat	76	11.6
Stockpiled fescue	60	11.0
Corn silage	69	8.5
Alfalfa, bloom	55	17.0
Dormant native	40	2.5
Prairie hay - mature	56	5.0

1 lb of corn offers 0.88 lb TDN
1 lb of prairie hay offers 0.56 lb T

For each pound of corn you can fe
have the same energy and will hav



Pricing

Mature Brome Hay @ $150/ton

- 0.87 Mcal/lb ME
- $150/ton ÷ 2000 = $0.075/lb as-is
- $0.075/lb as-is ÷ 0.926 DM = $0.08/lb DM
- $0.08/lb DM ÷ 0.87 Mcal/lb = **$0.093/Mcal DM**

Alfalfa Hay @ $260/ton

- **0.99 Mcal/lb ME**
- $260/ton ÷ 2000 = $0.13/lb as-is
- $0.13/lb as-is ÷ 0.906 DM = $0.14/lb DM
- $0.14/lb DM ÷ 0.99 Mcal/lb = **$0.144/Mcal DM**

Pricing

Corn @ $240/ton

- **9.8% CP/lb DM**
- **$0.12/lb as-is ÷ 0.90 DM = $0.136/lb DM**
- **$0.136/lb DM ÷ 0.098 CP = $1.388/lb protein DM**

Distillers at $275/ton

- **30.4% CP**
- **$275/ton ÷ 2000 = $0.14/lb as-is**
- **$0.14/lb as-is ÷ 0.908 DM = $0.15/lb DM**
- **$0.15/lb DM ÷ 0.304 CP = $0.498/lb protein DM**

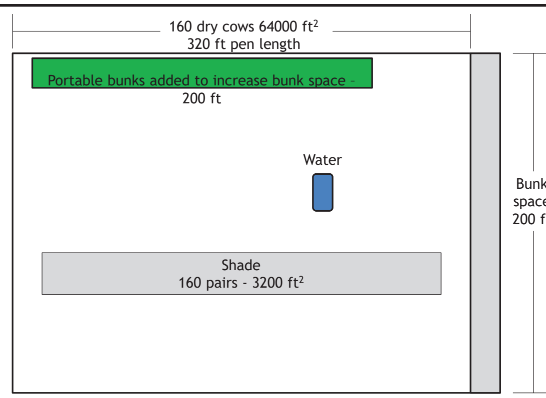
LIMIT FEEDING COWS

TMR

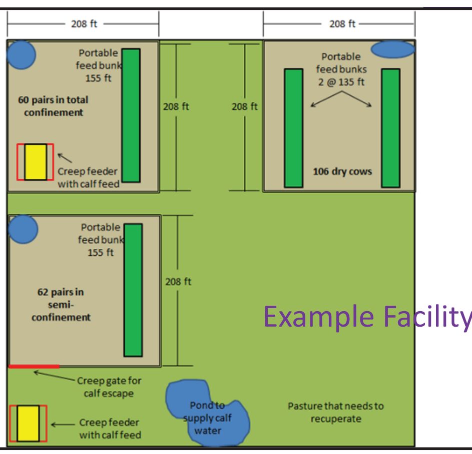
- Total mixed rations
  - Silage, corn, straw/stalks, distillers grains
- High density diets so need to reduce the amount offered to meet, not exceed requirements
- Safely can reduce intake to 1.7% of body weight on DM basis if going back to grass
  - 1300 lb cows x 0.017 = 22.1 lbs DM if ration is 50% DM then feed 44.2 pounds of ration

Facilities and Health

- Do you have somewhere to go with the cows?
  - Feedlot
  - Sacrificed a portion of pasture
  - Dry-lot
- Does the place have abundant, easily assessed water?
- Do you have a Health protocol for cows and calves?



Example Facility



- **Farney, J. K.,** S. Johnson, C. Reinhardt, G. Tonsor, and J. Petersilie. 2014. MF-3115. Managing cows in a Confinement Situation. Kansas State University, August. https://www.bookstore.ksre.ksu.edu/pubs/MF3115.pdf
- **Farney, J. K.,** S. Johnson, C. Reinhardt, G. Tonsor, and J. Petersilie. 2014. MF-3114. Decision Tree. Options for Management of Cows and Calves during Drought. Kansas State University, August. https://www.bookstore.ksre.ksu.edu/pubs/MF3114.pdf

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Confinement Feeding Production Cows: The Art and the Science

Karla H. Jenkins, Shelby Gardine,
Jason Warner, Terry Klopfenstein,
Rick Rasby

University of Nebraska Lincoln EXTENSION

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Chart by Aaron Berger, Beef Educator in the Panhandle

Price Per Pair Per Month	Price Per Ton Equivalent
$30	$50
$35	$58
$40	$67
$45	$75
$50	$83

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Diet Calculations

Gestation w/o lactation, 11 lb of TDN, 2 lb of protein, 1.8% DM intake 1200 lb cow

Commodity	DM, lb	As is lb	Cost/ton	Cost of Diet
straw, 45% TDN	18	20.5	85	.87
WDGS, 108% TDN	3	8.6	50	.21
				$1.08/d

Lactation diet, 60 day old calf, 16 lb TDN, 2.75 lb protein, 2.2% DM intake same cow

straw, 45% TDN	20	22.7	85	.97
WDGS, 108% TDN	4	11.4	50	.29
Beet pulp, 90% TDN	3	12	35	.21
				$1.47/d

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Limit Feeding Confinement Cows

- **Data from UNL suggests:**
- **Energy dense by products can be mixed with low quality crop residues**
- **Dry matter intake can be limited**
- **Cow condition can be maintained because nutrient needs are being met**

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Gestating Cow Performance

Item	20% Pulp	45% Pulp	SE	*P* value
Initial BW, lb	1202	1196	27.0	0.86
Initial BCS	5.2	5.2	0.13	0.79
Final BW, lb	1307	1310	24.9	0.92
Final BCS	5.6	5.7	0.08	0.20
BW change, lb	105	115	9.9	0.50
BCS change	0.4	0.5	0.12	0.57

20% distiller in all diets - rest is wheat straw

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Non-Creative Diets for Confinement

- Late gestation, multiparous cows
- Limit fed ground alfalfa (20 lb dm, 1.8% BW)
- Limit fed 30:70 WDGS:wheat straw (18.3 lb dm, 1.7% BW) also 0.3 lb/d limestone
- Targeted 11 Mcal/d (60% TDN)

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Gestating Cow Performance

Item	ALF HAY	WDGS STRAW	P value
Initial Weight, lb	1094	1089	0.86
Initial BCS	5.5	5.4	0.74
Final Weight, lb	1238	1256	0.53
Final BCS	5.8	5.8	1.00
Change in Weight, lb	+144	+167	0.01
Change in BCS	+0.34	+0.39	0.66
Calf Birth Weight, lb	81.8	81.6	0.96

[1]HAY = alfalfa hay, WDGS= 30:70 WDGS:wheat straw

Mineral Supplement

- Calcium should always be added to high distillers grains diets due to the Phosphorus content of distillers grains
- Trace minerals and Vitamins should be provided as well preferably in the mix
- If limit feeding and feeding free choice mineral do not let cows over consume

Accounting for the Dry Matter Intake of the Calf

Diet (DM ratio)	Ingredients	Late Gestation Cow	Lactating Cow	Cow with 60 d old calf
		Dry matter intake, lb		
57:43	Distillers grains:straw	15.0	18.0	20.0
30:70	Distillers grains:straw	19.2	23.0	25.6
40:20:40	Distillers grains:straw: silage	15.4	18.5	20.6
20:35:45	Distillers grains:straw: beet pulp	14.6	17.5	19.4

Lessons Learned from Total Confinement

- Pairs can be maintained in total confinement, although it is rarely the least expensive system
- Using the most inexpensive commodities is important
- Limit feeding cows energy dense diets maintains cows - calves may need additional feed resources
- Early weaning may be a useful management tool

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Lessons Learned from Total Confinement

- Calves learned to eat with their mothers
- Learned what the feed truck was

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LIMIT FEEDING OF HAY

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Access to hay time

	Access Time, h			P-Value	
Item	6	14	24	24 h vs. restricted	14 vs. 6 h access
DMI, lb	21.2	24.4	27.4	< 0.0001	< 0.01
Hay waste, lb*	0.8	4.2	7.7	<0.0001	0.0026
BW change, lb	27.3	36.5	51.2	0.051	> 0.10

*Expressed as a % of DMI
Adapted from Jaderburg et al., 2011

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Ad libitum access to feeders

Item	6 hr	24 hr	Difference, %
Hay DM intake, lb	23.1	29	22.6
Hay DM waste, %	13.4	21.2	44.2
Cow BW change, lb	109.8	142.1	28.3

Average from Jaderborg et al., 2011; Miller et al., 2007; Miller et al., 2007

Limit feeding
- Acceptable performance
- Decreased DMI
- Decreased hay wastage
- Decreased overall costs

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Issues/Concerns

- Accurate estimate of ad libitum intake and determining the degree of restriction is critical
- Do not limit feed for first calf heifers or thin, older cows
- Initial cow body condition important
- Do not use with extremely low quality forage

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UNDERSTANDING HAY BALE FEEDERS AND HAY WASTAGE

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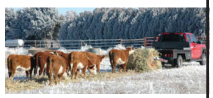
Popular hay feeding systems

- Ground unrolling
- PTO – Driven Bale Processor
- Bale feeder

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Effect of hay feeding methods

Item	Feeding method: Roll out on ground	PTO processor	Tapered cone feeder	P-value
BW gain, lb	49.6[a]	66.0[b]	79.6[b]	< 0.01
ADG, lb	0.84[a]	1.19[b]	1.35[b]	< 0.01
Total cost per cow, $	109.02	127.01	100.26	

a,b,c Within a row, least squares means without a common superscript letter differ ($P < 0.05$).

Landbolm et al., 2007

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Large round bale feeder design affects on hay utilization

Item	Feeder Type: Cone	Ring	Trailer	Cradle
Daily hay disappearance, lb/cow	26.5[a]	26.7[a]	30.7[b]	28.5[ab]
Daily hay waste, lb/cow	0.88[a]	1.54[b]	3.53[c]	4.19[c]
Hay waste, %	3.5[a]	6.1[b]	11.4[c]	14.6[c]
Daily hay intake, lb/cow	25.4	25.1	27.1	24.2
Intake/cow BW, %	1.8	1.8	2.0	1.8

a,b,c Within a row, least squares means without a common superscript letter differ ($P < 0.05$).




Burskirk et al., 2003

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Modified Cone Feeder

Conventional open bottom ring feeder

Polyethylene pipe open bottom ring feeder

Sheeted bottom steel ring feeder

Oklahoma State University

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Implications

- Modified cone feeder and tapered bale feeder models most efficient design
  - Less waste = longer feeding period = less hay used
  - Cone = Ring < Trailer < Cradle
- Feeder design did no affect DMI

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Hay Feeders

- Values back for producer
  - Assume hay costs $120/ton and a 120-d feeding period
  - Cow will eat 30 lbs/d over 120 d = 1.8 ton
    - 21% wastage = feed 2.18 tons
    - 5% wastage = feed 1.89 ton
  - $261.60 cost with open bottom (21% waste)
  - $226.80 cost with modified cone (5% waste)
  - $34.80 difference per cow or $0.29/hd/d

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HOW DO WE USE ANNUAL FORAGES FOR CATTLE?

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Forage Quality

Species	NDF %	ADF %	Calculated TDN
Barley	40.6	13.9	79.9
Black Oats	42.0	24.0	73.3
Purple Top Turnip Bulb	—	13.8	79.9
Purple Top Turnip Leaf	17.6	10.3	82.2
Radish Bulb	18.0	14.9	79.2
Radish Leaf	20.3	12.1	81.2
Tillage Radish Bulb	14.0	12.0	81.1
Tillage Radish Leaf	22.0	18.1	77.1
Rye	33.6	12.7	80.7
Cow Pea/Soybean	36.0	16.3	78.3
Triticale	38.4	15.4	78.9
Triticale/Oats	36	14.7	79.3
Turnip/Radish/Brassica Bulb	18	10.6	82.0
Turnip/Radish/Brassica Leaf	--	17.7	77.4
Wheat	39.5	15.7	78.7
Winter Pea	21.6	15.7	78.7

A 1400 lb dairy cow producing 120 lbs/d needs 45.9 lbs of TDN/d = Most of these winter forages meets 73% of a Holstein cows peak milk production .... Food for thought

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Annual Forages and Cows

- Cow requirements, especially if dry, pregnant is much, much lower than what is offered by the annuals (primarily energy and in winter annuals high protein)

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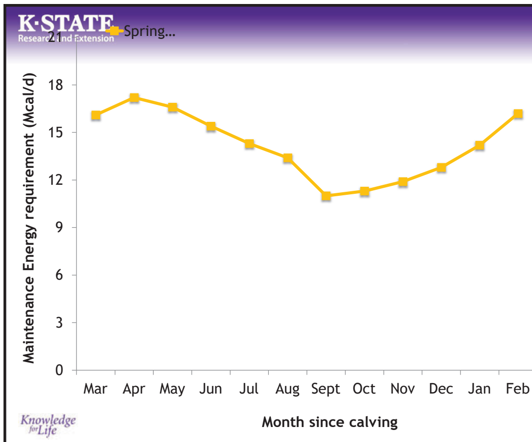

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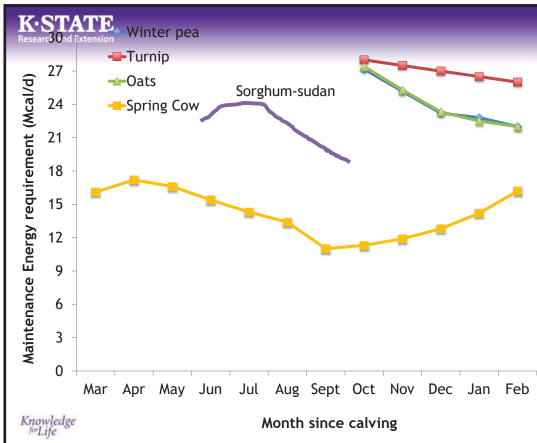

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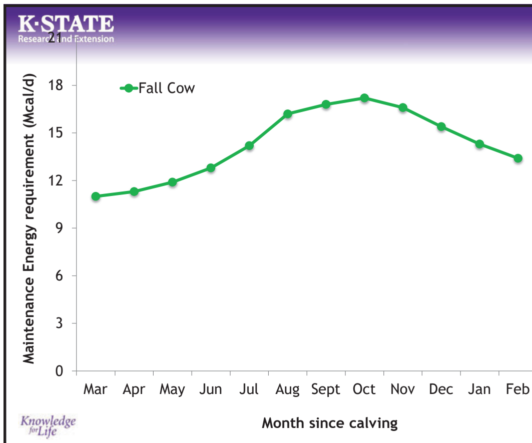
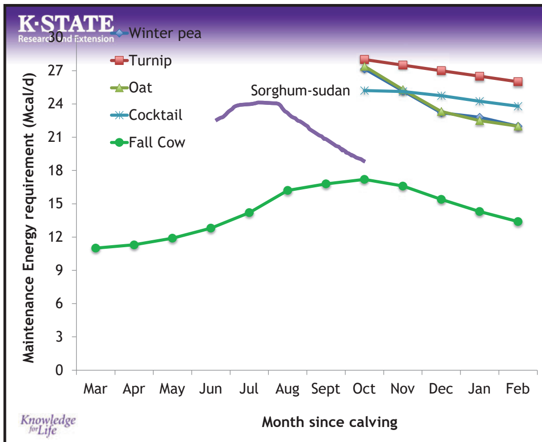
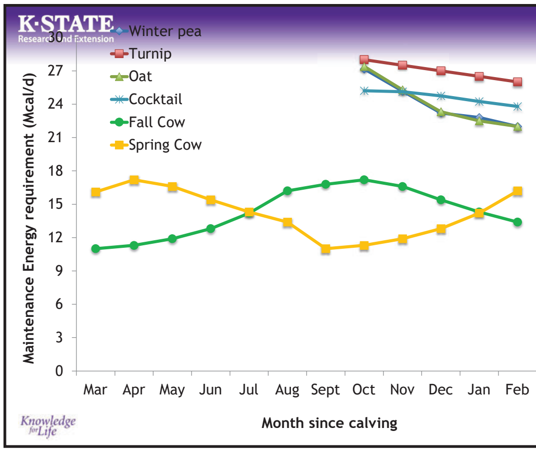
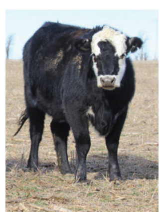






Annuals and Cows

- Issues
  - Too much body condition
  - Inefficiency in production system
  - Loss of potential revenue
- Practices to manage for this:
  - Short term grazing on high quality forage
  - Combination paddock
  - Strip limit graze



Limit grazing

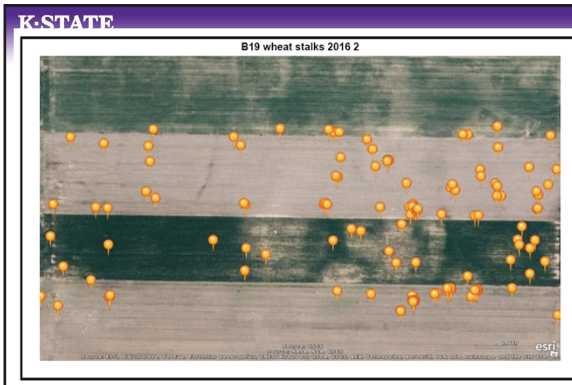
- Allow cows a couple of hours/d to graze high protein, high energy forage at least 3x/week

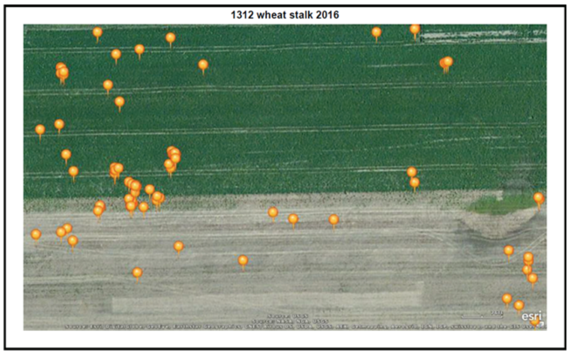
Combination paddock

- Portion of pasture is low quality roughage or other portion is high quality annual
  - Planting corners of circles with high quality forage
  - Fencing both types of forage
  - Flying on annuals into residue??

How much high quality pasture need – winter annuals??

- Really for spring cows don't need anything other than corn stalks for 1st month of grazing
- If only want to fence once – determine was maximal acreage is needed for the highest nutrient requirement period and multiply by days (90 d)
  - Cow needs 1.14 ac of cocktail and 1.93 ac of stalks
- Fall cows for 90 d
  - Cow needs 1.51 ac of cocktail and 2.18 ac of stalks





Strip limit grazing

- Assume have rye-radish pasture average TDN is 80%
- 1300 lb pregnant dry cow needs 16 lbs TDN/d the last month before calving (only needs 11 lbs/d TDN in months 5-6 of pregnancy)

16 lbs TDN = 0.80 lbs TDN/lb intake x ? lbs intake

20 lbs DMI/d

Strip limit grazing

~150 lbs DM/inch of growth

9 inch tall = 1350 lbs/acre DM forage

Eat 50% so 675 lbs DM/ac available

20 lb DMI x 100 cows = 2000 lb DMI/day

2000 lb ÷ 675 = 3 acres/d

If you want to move every other day 6 ac

Every 3rd day 9 ac , etc

Sorghum Grazing

- Rotational grazing best option
  - Start grazing sorghum when > 24 inches tall
  - Graze until 8 inches left
  - Grazing time per paddock should be less than 10 days – optimal a couple days
  - Rest time ~25 days should give 24 inches
  - Estimated stocking rate 5-6 AU/acre

Sudangrass and millet grazing considerations

- Rotational grazing still best option
  - Start grazing 18 inches tall
  - Stop grazing 8 inches tall
  - Grazing days 7-10 days
  - Rest period of ~21 days
  - Estimated stocking rate 4-5 AU/acre

Additional information

- MF3244 – Forage Crops Grazing Management: Toxic Plants
  - www.bookstore.ksre.edu/pubs/MF3244
- Beef Tips May 2015
  - http://www.asi.k-state.edu/about/newsletters/beeftipsMay2015.pdf
  - *"Sorghums and millets for summer forage"*
  - *"Estimating the amount of forage available for grazing in summer annuals"*
- Android and iPhone mobile app – Grazing Mgmt Toxic Crops

Weaned Calves

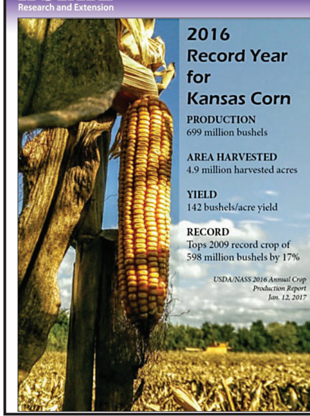
- Most of the time, we still are offering too much protein (much higher than requirements)
- Need another source of dry forage/feed
- Maximize gain potential want to make protein to energy ratio optimal
- Maximize gain = maximum dry matter intake

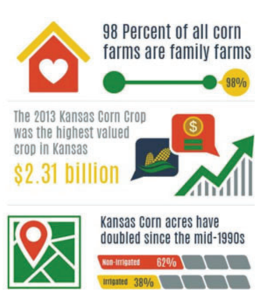
Value of winter cover crops - stockers

- Nebraska data showed that calf gains are VERY variable with cover crop mixtures
- Over 10 studies
  - ADG ranged from 0.8 lb/d up to 2.3 lb/d
  - Same cocktail in back-to-back years
    - 2.3 lb/d one year and 1.3 lb/d next year

Calf gains on cereal grains

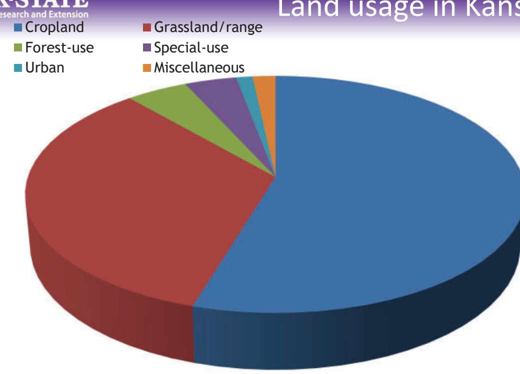
Cereal type	Cattle Type	Gain	Location
Oat	Heifer	1.96	North Dakota
Barley	Heifer	1.96	North Dakota
Barley	Heifer	1.75-1.96	South Dakota
Barley	Steers	3.0	Canada
Oat	Steers	2-3.5	Canada
Rye	Steers	2.25-2.6	Canada
Triticale	Steers	1.7-2.4	Canada
Wheat	Steers	1.87	Canada
Oat-Ryegrass	Steers	3.06	Alabama
Oat-Rye-Ryegrass	Steers	2.78	Alabama
Rye-Ryegrass	Steers	2.50	Alabama
Ryegrass	Calves	1.96	Florida
Ryegrass-triticale	Calves	1.68	Florida





Kansas Corn Commission

Land usage in Kansas



Major Uses of Land Report, ERS 2012

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Observations with integration

Items evaluated	Results
Winter forage supply from corn residue plus rye + oat + turnip (*Brassica rapa* L. subsp. *Rapa*) mixture grown on cropland	adequate from November to January, may last longer under favorable weather; supplemental feed needed in late winter, especially for pregnant cows
Soil compaction and soil organic matter	cattle trampling on cropland caused some soil compaction, but had minimal effects on soil properties and no detrimental effect on crop yield; soil organic matter increased significantly within 5 yr of conversion from corn–soybean rotation suggesting rapid building of soil organic matter in the integrated system
Weed biomass in system	winter grazing on crop fields suppresses weed biomass through trampling and grazing; however, presence of cover crops is just as effective in reducing weed biomass
Nutrient cycling	cattle on winter cropland concentrate nutrients near water sources through manure deposition; thus, animal excreta may not improve overall soil fertility due to uneven redistribution of nutrients
Economic return	cattle operation in integrated system is competitive with other cattle systems used in Illinois, but there is room for improvement; total feed costs in 2004 were \$158 cow^{-1}, compared with the Illinois state average >\$200 cow^{-1}; additional inputs spent on grazing have reduced overall feed expenditures

SULC & TRACY: INTEGRATED CROP-LIVESTOCK SYSTEMS IN THE U.S. CORN BELT, 2007

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Are stalks a viable feed option for cattle?

- Low cost feed option
- CP: 5-8%
- TDN: 40-70%
- Quality is higher in dryland corn than irrigated
- Requirements for a 1400 lb dry cow in last trimester
  - CP: 6.9 – 8.9%
  - TDN: 49.1-56.6%

Knowledge for Life

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Stats for corn residues

	Corn	Sorghum
Leaves		
CP, %	5.18	6.75
TDN, %	49.5	51.3
Stem		
CP, %	4.05	4.20
TDN, %	43.7	50.2

*Taylor et al. (1999) Cattlemen's Day

Item	Proportion, % Irrigated	Proportion, % Dryland
Grain	4.0	4.0
Leaf and husk	45.0	51.0
Stalk	40.0	33.0
Cob	11.0	12.0

Corn	Percent DM	% CP - Range	% CP - Average	% TDN - Range	% TDN - Average
Grain	73	9.5-11.2	10.2	88-95	90
Leaf	76	6.2-7.5	7.0	41-65	58
Husk	55	3.0-4.0	3.5	63-72	68
Cob	58	2.1-3.8	2.8	59-65	60
Stalk	31	3.0-5.1	2.7	45-60	51

1400 lb cow
8% CP
52% TDN

Knowledge for Life

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Stats for milo residues

	Corn	Sorghum
Leaves		
CP, %	5.18	6.75
TDN, %	49.5	51.3
Stem		
CP, %	4.05	4.20
TDN, %	43.7	50.2

*Taylor et al. (1999) Cattlemen's Day

Milo	Percent DM	% CP - Range	% CP - Average	% TDN - Range	% TDN - Average
Grain	74	10.3-11.0	10.5	85-95	90
Leaf	66	6.0-13.0	10.0	40-65	57
Stalk	25	3.3-3.9	3.6	53-58	53

1400 lb cow
8% CP
52% TDN

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Kansas Statistics

- 5.30 million acres – corn for all purposes
- 5.15 million acres – corn for grain
- State carrying capacity for cows assuming:
  - 1400 lb dry cow
  - Utilizes 50% of stalks
  - Average corn yield in KS 142 bu/ac (KSCC, 2016)
  - Graze for 90 d
  - Stocking rate 1 cow/3 ac

1,716,666 cow ~ 1.7 million cows

1.6 million cows in KS → 6.4 million cows+calves (USDA NASS, 2017)

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Using stalks

- Cattle preferentially graze stalks
  - Corn > husks = leaves > cobs > stem
- Different grazing strategies
  - Season long grazing
  - Strip grazing
  - Short duration heavy stocking

Utilization by cattle

Plant part	Dryland	Irrigated
TOTAL		
Leaf	50	55
Stem	5	10
Cob	63	50
Grain	96	98

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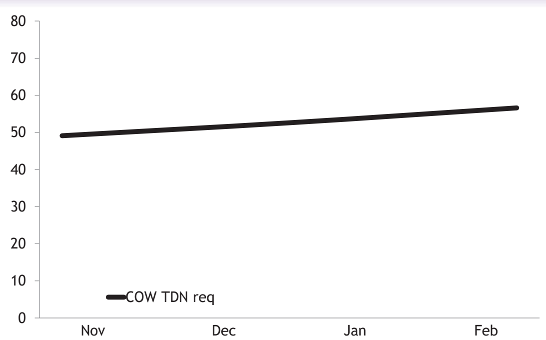
Stocking rate

- VERY important with decisions about grazing plan
- Calculations:
  - 16 lb of husk and leaf/bu of corn
  - Assume consumption of 50% of these
  - 1 AU = 1000 lb cow = 702 lb DM intake monthly
  - 1400 lb cow = 1.4 AU = 982.8 lb DMI monthly (1.4 x 702 lb)
  - 142 bu/ac = 2272 lb husk/leaf x 50% = 1136 lb for consumption
  - 1136 ÷ 982.8 = 1.16 AUM
  - 1.16 AUM x 30 d = 34.8 d of grazing for one 1400 lb cow on one acre

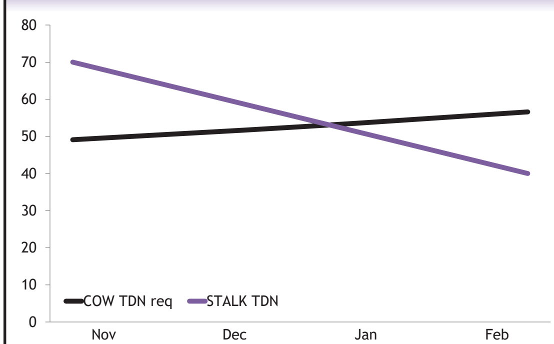
Season long grazing

- Cows will do well at the start of the season, because they will have corn and leaf/husk
  - As corn decreases left with lower quality feeds
- Many times you can stock 1400 lb cows at 1 hd/ 3 acre for 90 days and they will be fine for the first 30-45 d
  - After that need to supply a protein source to meet requirements

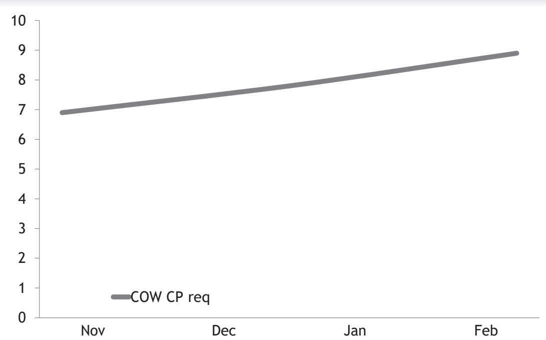
Hypothetical forage by time



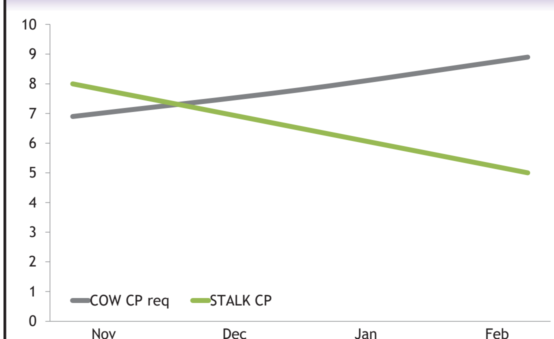
Hypothetical forage by time



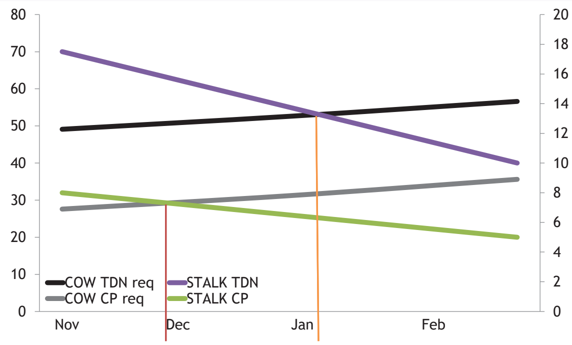
Hypothetical forage by time



Hypothetical forage by time



Hypothetical forage by time



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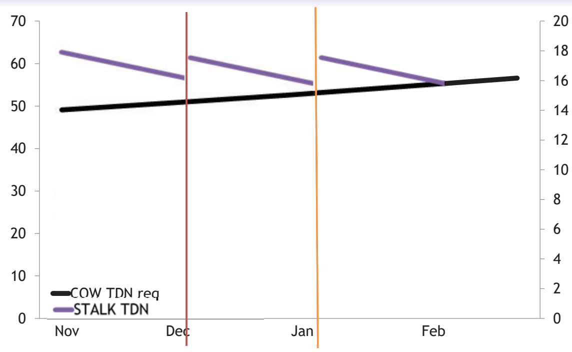
Short duration – heavy stock

- Maximal quality intake occurs in 30-60 d
- Stock heavy minimize the number of days with very low quality feed
- Example (assuming a 142 bu/ac corn yield):
  - 1400 lb cows stocked at 1 head/acre for 30 days
  - 1400 lb cows stocked at 1 head/2 acre for 60 days

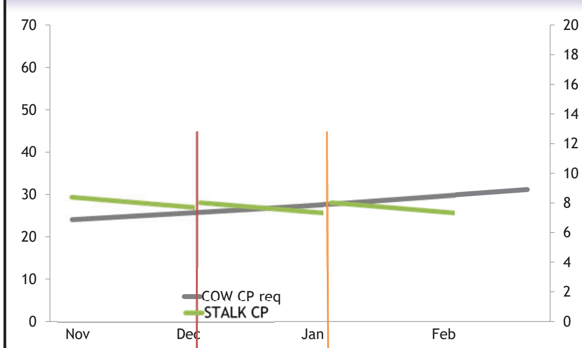
Knowledge for Life

Hypothetical forage by time



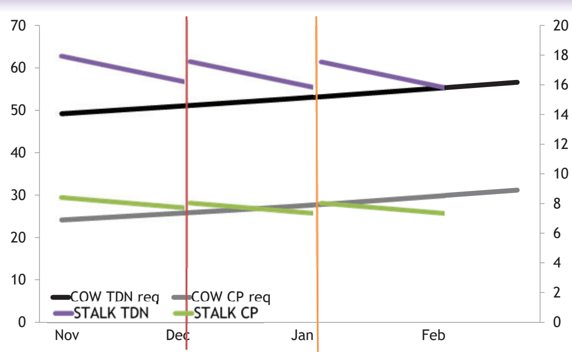
Knowledge for Life

Hypothetical forage by time



Knowledge for Life

Hypothetical forage by time



Knowledge for Life

Strip grazing

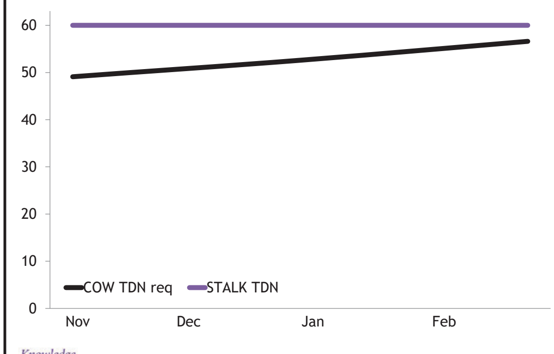
- Strip grazing will increase the total grazing days
- Provides a more consistent diet to cows
- Set up strip sizes so that stocking rate will be equivalent to have cows consume 50% of residue within a week to two weeks
  - 5 cows (1400 lb)/acre for 1 week
  - 2 cows (1400 lb)/acre for 2 weeks

Knowledge for Life

Theory behind strip grazing

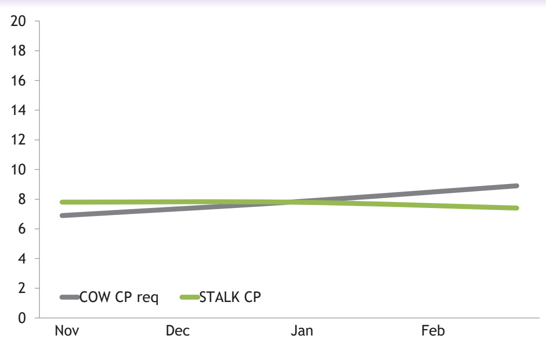
- Each time cows go to a new strip they will have access to a whole new area that will have grain and leaf-husk everyday
  - Won't be forcing cows to eat stalks
  - No dilution in quality due to eating stalks
- Nebraska data shows that there is about 1 bu/ac of grain left in field after harvest
  - 56 lbs corn/ac available
  - Corn really does not degrade
  - Less trampling so more likely to consume
- Keeps the total diet TDN and CP higher

Hypothetical forage by time



Strip grazing

Hypothetical forage by time



Strip grazing

Grazing plan with cows

- The method that requires the least amount of supplementation has the greatest amount of labor – strip grazing or short duration grazing
  - Labor at $12/hr (Shike, Faulkner, Ballard, U of I, 2008)
    - Every 2 weeks estimated to add $0.01/hd/d
    - Every week estimated to add $0.02/hd/d
- If want to continuous graze without hauling extra protein and/or energy use annual forages

Cow and calf performance

Item	WinterRange		Corn Stalks	
	No Supple	Supple	No Supple	Supple
Cow BCS pre-calving	4.8	5.2	5.4	5.2
Cow BCS weaning	5.1	5.2	5.2	5.1
Calf BW, lbs	81	84	82	86
Calf WW, lbs	495	543	539	517
Carcass wt, lbs	785	827	816	810
Choice, %	77	85	65	88
Premium Choice, %	27	43	15	35
Treated % birth-weaning	17	17	19	20
Treated % wean-finish	12	0	11	3

Larson et al., 2009

Cow and heifer performance

Trait	Treatment[1] WR PS	WR NS	CR PS	CR NS	SEM	Treatment P-valu Sys	Supp
n	6	6	6	6	—	—	—
Calf birth date, Julian d	84	86	80	87	2	0.51	0.04
Calf birth BW, lb	77.4	74.5	78.7	79.4	2.0	0.07	0.49
Calf weaning BW, lb	507	481	516	509	13	0.03	0.04
Adj. calf weaning BW, lb	478	454	478	485	9	0.02	0.15
Post-weaning ADG, lb	1.10	1.08	1.06	1.10	0.11	0.86	0.72
Pre-breeding BW, lb	712	679	710	717	33	0.17	0.24
Preg. diagnosis BW, lb	809	780	811	825	24	0.06	0.54

Trait	Treatment[1] WR PS	WR NS	CR PS	CR NS	SEM	Treatment P-val Sys	Supp
n	6	6	6	6	—	—	—
Age at puberty, days	355	370	348	361	9	0.32	0.09
BW at puberty, lb	615	619	626	635	24	0.50	0.72
Pubertal, %	91	74	79	84	7	0.71	0.38
Pregnant, %	91	77	88	83	7	0.96	0.13

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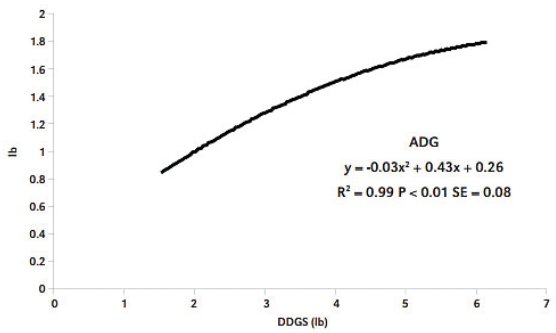
ADG calves on cornstalks



Rasby, Drewnoski, Stalker, 2014

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Stocker performance

Brown Midrib Grain Sorghum Residue

	Con	BMR	SEM	*P*-value Hybrid
Initial Wt, lb	530	526	2	0.19
Ending Wt, lb	597	618	4	< 0.01
ADG, lb	1.03	1.39	0.06	<0.01

2 years of data, average 69 days grazing

6 steers/5.75 acre/ave. 69 days NE Beef Report 2010 pp.40-41

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IONOPHORES

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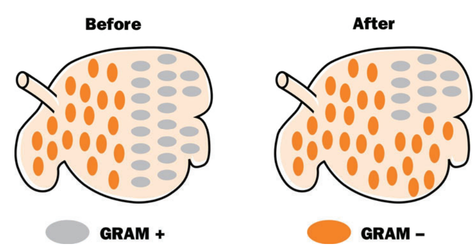
Rumen Bacterial Population Changes[1]



[1]Adapted from Dawson and Boling. 1983. Appl Environ Microb 46:160.

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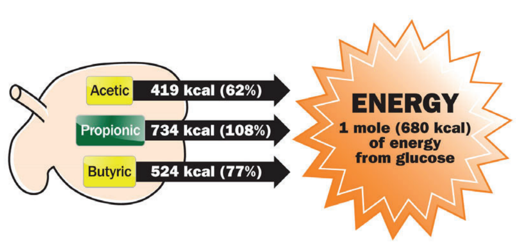
Efficiency of Energy Conversion[1]



[1]Adapted from Nagaraja, T. G., C. J. Newbold, C. J. Van Nevel & D. I. Meyer. 1997. Manipulation of Rumen Fermentation. The Rumen Microbial Ecosystem, 2nd edition. Ed: Hobson & Stewart. pp. 538-547.

Knowledge for Life

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Rumensin for Mature Beef Cows

- **Only ionophore** approved for use in mature, reproducing beef cows
- **Improves feed efficiency**, which helps maximize profitability
- Maintains body condition on **5% to 10% less feed**

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Four-trial dose titration, summary of cow weight change and feed intake data

	Rumensin, mg/hd/d		
Item	0	50	200
Number of cows	108	99	109
Initial wt, lbs	1,063	1,050	1,049
Final cow wt, lbs	1,016	1,006	1,010
Wt. change, lbs	-47	-44	-39
Feed intake (lbs DM/day/exp unit)			
0-171 days	164.2^{a}	155.7^{b}	146.4^{b}
Percent of control	100	94.8	89.2
Avg days on study at calving	124	123	125
Days from calving to conception	93^{c}	87^{d}	87^{d}
Number of cows bred	99	93	100
Number of cows conceived	90	86	97
Percent conception	90.9	92.5	97.0

[a,b] Means within a row with different superscripts differ by (P<0.01).
[c,d] Means within a row with different superscripts differ by (P<0.01).

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Rumensin for Mature Beef Cows — Reproductive Safety[1] 2007 Trial

	Monensin, mg/hd/d	
	0	200
No. pastures[2]	12	12
Conception date[3]	161^{a}	155^{b}
Calf to conception, days	90^{a}	85^{b}
Calving percentage[4] (%)	80.7^{a}	91.9^{b}

[a,b]Means within a row without a common superscript differ (*P* < 0.01).

[1]Bailey et al., 2007. Can. J. Anim. Sci. 88:113.
[2]Pasture was the experimental unit, and each pasture contained 9 to 11 cow-calf pairs.
[3]Julian calendar date.
[4]Logistic regression analysis.

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Effects of Monensin on Beef Cow Performance, Oklahoma State University Study

	Supplement[1]			
Item	CONT	MON	SEM[2]	P-value[3]
No.	28	28		
Initial BW, lbs	1082	1090	21	0.79
Initial BCS	5.15	5.21	0.10	0.70
Final BW, lbs	1117	1153	23	0.28
Final BCS	5.28	5.81	0.14	0.01
Change in BW	35.4	65.1	10.1	0.04
Change in BCS	0.13	0.57	0.12	0.01
ADG, lbs/day	.62	1.12	.18	0.04

[1] CONT = 36% CP cottonseed meal based pellet with 0 mg/hd of monensin; MON = 36% CP cottonseed meal based pellet with 200 mg/head of monensin.
[2] SEM of the Least squares means.
[3] Observed significance levels for main effects.

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Effect of mineral medication treatments on stocker performance, KSU Stocker Unit

BEEF STOCKER

	Treatment		
	Aureomycin + Bovatec	Rumensin	SEM
Mineral intake, oz/hd/d	4.22^{a}	2.39^{b}	0.01
Feed Additive intake, mg/hd/d	325/186	105	
On-test stocker weight, lbs	583	582	4.1
Off-test stocker weight, lbs	739	743	5.3
90-day daily gain	1.73	1.79	0.06

[a,b] Means within a row with different superscripts differ by (P<0.01).

Estimated no observed effect level (NOEL), toxic and lethal dose (mg/kg BW) ranges

		Toxic and lethal dose ranges, mg/kg BW	
Species	Parameter	Lasalocid	Monensin
Cattle	NOEL	1.0	5 - 30
	Toxic range	10 - 100	12 - 20
	Lethal dose range	50 - 100	22.4 - 39.8
	LD_{50}	--	26.0
Horses	NOEL	--	--
	Toxic range	15 - 20	--
	Lethal dose range	> 20	1 - 3
	LD_{50}	21.5	1.4
Sheep	NOEL	--	--
	Toxic range	45 - 60	--
	Legal dose range	> 60	--
	LD_{50}	--	11.9
Swine	NOEL	--	--
	Toxic range	30 - 50	40 - 50
	Legal dose range	> 50	--
	LD_{50}	--	16.7

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Summary

- Ionophores are an effective tool for:
  - Improved feed efficiency
  - Improved rate of gain in stockers
  - Slight improvement in ADG in feedlot cattle
  - Decreased feed intake (which may enhance the carrying capacity of cattle on a given quantity of forage)
  - A potential protein sparing effect
  - Increased digestibility of low quality forages
  - Some reduction in the incidence of coccidiosis
  - A decrease in the incidence of lactic acidosis
  - Some reduction in the incidence of feedlot bloat
  - Partial intake regulation in self feeding supplement systems
  - Some reduction in the incidence of pulmonary emphysema

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Differences in ionophores

Monensin
- Decrease intakes
- Increase gains
- Use in mature cows
- Use in growing cattle
- Use in goats

Lasalacid
- Minimal effect on intakes
- Increase gains
- Greater palatability
- Not approved for cows
- Use in growing cattle
- Use in sheep

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Other things to think about

- Preg check and cull
- Group by cow body condition
- Not all of these options will work in every operation
  - Select and adapt to your operation
- Make strategic culling decisions

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Questions

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